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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,006	08/06/2003	Koichi Fukuda	OKI.561	7606
20987	7590	07/29/2005	EXAMINER	
VOLENTINE FRANCO, & WHITT PLLC ONE FREEDOM SQUARE 11951 FREEDOM DRIVE SUITE 1260 RESTON, VA 20190			HU, SHOUXIANG	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/635,006

Applicant(s)

FUKUDA, KOICHI

Examiner

Shouxiang Hu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 7-12 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-6 and 13-20 is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's arguments regarding the election requirement in the 05-20-2005 amendment have been fully considered but they are not persuasive for the reasons provided in the previous office action.

Furthermore, claims 7-12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being unreadable on the elected species. Claim 7 recites the subject matter that the recited silicide layer is formed directly on the source/drain region of the thin silicon layer. However, it is not readable on the elected Species I of Figs. 3-11, in which the silicide layer (46) is completely separated from, instead of directly on, the thin silicon layer (33; including the source/drain regions therein) by the polysilicon layer (43). It is noted that such a subject matter appears to be readable only on the non-elected species II of Fig. 12, in which a silicide layer may be formed directly on the source/drain region of the thin silicon layer (33) through the opening in the polysilicon layer (43).

Accordingly, claims 1-20 are pending in this application; and, claims 1-6 and 13-20 remain active in this Office action.

### ***Claim Objections***

Claims 1-6 and 13-20 are objected to because of the following informalities and/or defects:

Claims 1 and 13 each recites the subject matters that the recited thin silicon layer is formed on the buried oxide layer; but they each fails to clarify that the thin silicon layer 33 in the instant invention is not exactly formed on the buried oxide layer, as the commonly-required single crystalline structure of the thin silicon film normally cannot be formed through deposition on an silicon oxide layer. Instead, commonly in the art including the instant invention, it is the buried oxide layer 34 that is formed beneath the thin silicon layer 33 through oxidation.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 13-17, 19 and 20, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 102(b) as being anticipated by Wakahara (JP 2000-183355; 06/30/2000; of record).

Wakahara discloses an SOI-MOS transistor (Fig. 11) which is naturally capable of functioning as a full depletion type as the SOI layer (3) therein can be as thin as 50 nm (see Paragraph 0020), comprising: a substrate (1); a BOX layer (2); the SOI layer (3) including a channel region and a source/drain region (9); an (element) isolation layer (4) siding the SOI layer on both of the two sides; a gate insulation layer (5); a gate

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electrode (6); a sidewall (11); and, a high mobility conductive layer including a silicon layer (13b) and/or a silicide layer (15), wherein the high mobility conductive layer is on, or extends to, the source/drain region, the gate electrode (6), the isolation layer (4) and the sidewall (11). It is noted that the silicon layer (13b) therein is naturally a polysilicon since the nature of the deposition in which at least a portion of the silicon layer (13b) is deposited on the isolation layer (4; silicon oxide).

Regarding claims 5 and 17, it is noted that thin silicon layer (3) in Wakahara is naturally about 20 to 80 percent of a total thickness of the polysilicon layer (13b) and the silicide layer (15), as shown in Figs. 10 and 11).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6 and 18, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakahara in view of Cheng (US 2002/0171107).

The disclosure of Wakahara is discussed as applied to claims 1-5, 7-11, 13-17, 19 and 20 above.

Although Wakahara does not expressly disclose that the thickness of the SOI layer (thin silicon layer) can be as thin as about 30 nm or less, it is art known that such

thickness is well within the commonly recognized range for fully depletion type SOI layer for achieving desired good channel performance, as readily evidenced in the prior art such as Cheng (see Paragraph 0014).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to SOI device of Wakahara with the thickness of the SOI layer being less than about 30 nm, per the teachings of Cheng, so that a full depletion SOI-MOS transistor with desired good channel performance would be obtained.

### ***Response to Arguments***

Applicant's arguments filed on May 20, 2005 have been fully considered but they are not persuasive.

Applicant's main arguments include: the silicon layer 13b in Wakahara is a single crystalline layer, instead of a polysilicon layer. In response, as explained in the claim regions above, the silicon layer (13b) in Wakahara is naturally a polysilicon, instead of single crystalline silicon, because at least a portion of the silicon layer (13b) is directly deposited on the isolation layer (4; silicon oxide). Since silicon oxide is naturally amorphous, it lacks regular lattice structure to support and guide the growth of another regular lattice structure on it. Accordingly, at least the portion of the silicon layer (13b) that is directly on the isolation layer (4) is inherently a non-single crystalline one. Thus, the silicon layer (13b) of Wakahara is overall inherently a polycrystalline layer, instead of a single crystalline one.

In addition, it is noted that the thin film silicon layer (3) in Wakahara is not exactly formed on the oxide layer (2). Instead, it is the oxide layer (2) that is formed through oxidation of a portion of the original single crystalline silicon layer, of which the thin film silicon layer (3) is the remaining part.

Applicant's arguments with respect to claim 7 have been considered but are moot, as the amended subject matter of claim 7 is no longer readable on the elected species, as explained in the Election/Restrictions section above.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-

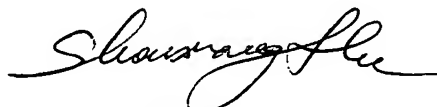
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1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH  
July 27, 2005



SHOUXIANG HU  
PRIMARY EXAMINER